

## **The calm after the storm: quiescent novae and symbiotics**

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Hydrogen burning white dwarfs in accreting binaries are among the most intriguing astrophysical objects, possibly on the evolutionary path towards a type Ia supernova explosion. I propose obtaining the light curves of a group of quiescent white dwarf systems (the classical novae V4743 Sgr and V363 Sgr and five symbiotic stars) and of the "red nova" V4332 Sgr, all to be observed in Kepler field 7. The novae and two of the symbiotic stars (FN Sgr and MWC 960) should be monitored with the 1 minute cadence, while for the other objects, including three symbiotics (AS 316, AS 327 and V2601 Sgr) that appear to be only "near silicon" and should be observed only if it turns out to be feasible, the 30 minutes cadence is requested.

I plan to use timing analysis techniques to derive periodicities of the order of minutes and hours, including the still unknown rotation periods of the white dwarfs, which are very significant to better understand the evolution of these systems.

In the 1 minute cadence datasets, also the stochastic variability will be measured. Flickering revealing a direct connection with the mass transfer rate, as it has already been inferred for a few cataclysmic variables in previously obtained Kepler data, by obtaining multi-component power density spectra. The amplitude of the broad-band flickering is correlated with the flux, which is in turn dependent the mass accretion rate onto the white dwarf.

All the data I propose to obtain will be very important and significant in order to understand the evolution of these intriguing binaries. One of the novae, V4743 Sgr, has been observed in outburst in 2002-2003 and shortly thereafter, in optical and X-rays, revealing variability patterns that are still puzzling the theoreticians. Several detailed articles on the timing behavior of this nova in outburst and in quiescence have been written by mine and other groups, addressing the periodic modulations and quasi-periodic oscillations on timescales of the order of minutes and hours. We will verify how the observed periodicities evolve with time, how they differ in optical and in X-rays, and will make significant theoretical progress by understanding the physical evolution of this unusual nova. V4743 Sgr is particularly interesting also because it hosts a highly magnetized white dwarf (it is in fact an "intermediate polar"). The Kepler light curves of this intriguing nova should allow a breakthrough in understanding the evolutionary role of the white dwarf magnetic field and how it influences accretion and thermonuclear burning.

The other nova of our sample has not had an outburst since 1927, thus it is a key system to study how novae settle back into quiescent evolution after many years, and how mass transfer continues almost a century since the outburst. The two symbiotics that fall "on silicon" host two of the hottest white dwarfs ever observed, which seem to be burning hydrogen in a shell. These objects are on a path to a recurrent nova, to type Ia supernova outburst, or both. The "red nova" of our sample is instead a different type of binary system, a rare and unusual one, whose evolution is not well understood yet, but is crucial for the development of stellar evolution theories. Also in this case the Kepler light curve will be crucial in understanding the physical parameters of the system.

The goals of this investigation are fully consistent with the 2014 NASA strategic plan of discovering how the universe works, and exploring how it evolves, by studying the origin and evolution of binary stars.